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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KIM, RICHARD H	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/091,547	MORIMOTO, HIROKAZU	
	Examiner	Art Unit	
	Richard Kim	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 07 March 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4, 9, 12, 15, 18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. (US 6,507,385 B1) in view of Wang et al. (US 6,181,390 B1) and Aastuen et al. (US 5,699,139).

Referring to claim 1, Nishiyama et al. discloses a device comprising a liquid crystal display panel which comprises a pair of substrates facing each other (see Fig. 1, ref. 1, 2), columnar spacers formed on at least one of the substrates and configured to provide a clearance between the substrates (see Fig. 1, ref. 3), and a liquid crystal material filling the clearance between the substrates (see Fig. 1, ref. 4); wherein, where the temperature of the panel rises from 25°C to 50°C, the spacers keep elastically deformed by pressure applied from the substrates (see col. 9, lines 29-30), wherein the liquid crystal display panel is free from granular spacers (see Fig. 1). However, the reference does not employ a support member supporting the panel and configured to make the panel stand during use of the module, and wherein the volume expansion coefficient of the liquid crystal material falls within a range of $.65 \times 10^{-3}\ ^{o}C^{-1}$ to $.85 \times 10^{-3o}C^{-1}$.

Wang et al. discloses a support member supporting a liquid crystal display panel and configured to make the panel stand during use of the module (see Fig. 2, ref. 30). Aastuen et al.

discloses the volume expansion coefficient of a liquid crystal material falls within a range of .65 x 10^{-3} $^{o}C^{-1}$ to .85 x $10^{-3o}C^{-1}$ (see col. 1, lines 28-29).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ discloses a support member supporting a liquid crystal display panel and configured to make the panel stand during use of the module in order to improve the visual convenience of the display. Such a modification enables one to view the display while facing forward. Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made for the volume expansion coefficient of the liquid crystal material to fall within a range of .65 x 10^{-3} $^{o}C^{-1}$ to .85 x $10^{-3o}C^{-1}$ in order for the liquid crystal to expand at a rate within a range as to not create excessive pressure within the cell, thereby maintaining the consistency of the liquid crystal cell. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Referring to claims 9 and 21, Nishiyama et al., Wang et al. and Aastuen et al. disclose the device previously recited. However, Nishiyama et al. does not disclose that that H_o, H_1, β and ΔD_1 satisfy a relationship represented by the inequality:

$$H_o - H_1 + 25 * \beta * H_o > \Delta D_1,$$

Where H_o represents a height of the spacers at 25 degrees Celsius under a state that the pressure is removed, H_1 represents a height of the spacers at 25 degrees Celsius under a state that the pressure is applied, β represents a linear expansion coefficient of the spacers, and ΔD_1 represents an increase in the distance between the substrates which is calculated from an increase in volume of the liquid crystal material caused by a temperature elevation from 25 degrees to 50

degrees Celsius, where the left side of the inequality is larger than the right side of the inequality by at least .01 microns.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the invention satisfy the relationship represented by $H_o - H_1 + 25 * \beta * H_o > \Delta D_1$, where the left side of the inequality is larger than the right side by at least .01 microns since manipulating a relationship with already known parameters to obtain optimum results requires routine skill in the art. Moreover, such an inequality would enable the display to maintain uniformity at temperatures greater than 50 degrees Celsius, due to the increase range in which the spacers maintain deformity.

Referring to claims 15 and 22, Nishiyama et al., Wang et al. and Aastuen et al. disclose the device previously recited. However, Nishiyama et al. does not disclose that H_o, H_1, and ΔD_1 satisfy a relationship represented by the inequality:

$H_o - H_1 > \Delta D_1$,

Where H_o represents a height of the spacers at 25 degrees Celsius under a state that the pressure is removed, H_1 represents a height of the spacers at 25 degrees Celsius under a state that the pressure is applied and ΔD_1 represents an increase in the distance between the substrates which is calculated from an increase in volume of the liquid crystal material caused by a temperature elevation from 25 degrees to 50 degrees Celsius, where the left side of the inequality is larger than the right side by at least .01 microns.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the invention satisfy the relationship represented by $H_o - H_1 > \Delta D_1$, where the left side of the inequality is larger than the right side by at least .01 microns, since

manipulating a relationship with already known parameters to obtain optimum results requires routine skill in the art. Moreover, such an inequality would enable the display to maintain uniformity at temperatures greater than 50 degrees Celsius, due to the increased range in which the spacers maintain deformity.

Referring to claims 4 and 12, Nishiyama et al., Wang et al. and Aastuen et al. disclose the device previously recited. Nishiyama et al. further discloses that the temperature of the panel rises from 25 to 70 degrees Celsius (see col. 9, lines 29-30). However, the reference does not disclose that H_o, H_1, β and ΔD_1 satisfies a relationship represented by an inequality:

$$H_o - H_1 + 45 * \beta * H_o > \Delta D_2,$$

Where ΔD_2 represents an increase in distance between the substrates which is calculated from an increase in volume of the liquid crystal material caused by a temperature elevation from 25 to 70 degrees Celsius.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for H_o, H_1, β and ΔD_1 satisfies a relationship represented by an inequality, $H_o - H_1 + 45 * \beta * H_o > \Delta D_2$, since manipulating a relationship with already known parameters to obtain optimum results requires routine skill in the art. Moreover, such an inequality would enable the display to maintain uniformity at temperatures greater than 70 degrees Celsius, due to the increased range in which the spacers maintain deformity.

Referring to claim 18, Nishiyama et al., Wang et al. and Aastuen et al. disclose the device previously recited. Nishiyama et al. further discloses that the temperature of the panel rises from 25 to 70 degrees Celsius (see col. 9, lines 29-30). However, Nishiyama et al. does not disclose that H_o, H_1 and ΔD_2 satisfy a relationship represented by an inequality:

$H_o - H_1 > \Delta D_2$,

where ΔD_2 represents an increase in distance between the substrates which is calculated from an increase in volume of the liquid crystal material caused by a temperature elevation from 25 to 70 degrees Celsius.

It would have been obvious to one having ordinary skill in the art at the time the invention was made for H_o, H_1 and ΔD_2 to satisfy a relationship represented by an inequality: $H_o - H_1 > \Delta D_2$, since manipulating a relationship with already known parameters to obtain optimum results requires routine skill in the art. Moreover, such an inequality would enable the display to maintain uniformity at temperatures greater than 70 degrees Celsius, due to the increased range in which the spacers maintain deformity.

3. Claims 2, 5, 7, 10, 13, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al., Wang et al. and Aastuen et al., further in view of Imabayashi et al. (US 6,535,264 B1).

Nishiyama et al., Wang et al. and Aastuen et al. disclose the device previously recited. However, the references do not disclose a light source configured to irradiate the panel with light, wherein a highest temperature reached by the panel by continuously lighting the light source is equal to or lower for 50 degrees Celsius or 70 degrees Celsius.

Imabayashi et al. discloses a device wherein a highest temperature reached by the panel by continuously lighting the light source is equal to or lower than 70 degrees Celsius (see Fig. 11, ref. BL; col. 8, lines 7-8).

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the device to employ a light source configured to irradiate the panel with light, wherein a highest temperature reached by the panel by continuously lighting the light source to be equal to or lower than 50 degree Celsius or 70 degrees Celsius in order to provide light to the display to improve display brightness while maintaining a temperature below a threshold in which the uniformity of the display could be compromised due to excessive heat.

4. Claims 3, 6, 8, 11, 14, 17 and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al., Wang et al. and Aastuen et al., further in view of Kashimoto et al. (US 6,157,433).

Nishiyama et al., Wang et al. and Aastuen et al. disclose the device previously recited. However, the references do not disclose that the display region has a diagonal dimension equal to or longer than 12 inches.

Kashimoto et al. discloses a device wherein the display region has a diagonal dimension equal to or longer than 12 inches (see col. 3, lines 20-24).

It would have been obvious to one having ordinary skill in the art at the time the invention was made for the display to have a diagonal dimension equal to or longer than 12 inches in order to create a display that can be viewed from a relatively large distance.

Response to Arguments

5. Applicant's arguments filed 5 August 2003 have been fully considered but they are not persuasive.

6. In response to Applicant's argument that Imabayashi et al. is not related to a liquid crystal display module which only used columnar spacers, Examiner recognizes the reference's shortcoming. However, the newly added limitation necessitated the incorporation of a primary teaching to Nishiyama to meet the above limitations.

7. In response to Applicant's argument that Imabayashi et al. or Nishiyama et al. do not disclose thermal expansion of a liquid crystal display, Examiner asserts that liquid crystal, when subject to heat, inherently undergo thermal expansion. However, as to the specifically claimed coefficient of thermal expansion, the newly added limitation necessitated the incorporation of a secondary teaching to Aastuen et al. to meet the above limitations.

8. In response to Applicant's argument that Nishiyama et al. does not disclose that the liquid crystal display module is used in a state where its liquid crystal display panel is arranged vertically, Examiner has provided a statement of obviousness in view of Wang et al., recited above.

9. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Kim whose telephone number is (703)305-4791. The examiner can normally be reached on 9:00-6:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703)305-3492. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Richard Kim
Examiner
Art Unit 2871

RHK

TOAN TON
PRIMARY EXAMINER